

REMARKS

Objection to Specification

The specification has been objected to because there is no antecedent basis in claims 6, 20 and 44 for the thickness of the adhesive layer being a function of the pressure during pressing of the die and the leadframe. In response to this objection, the pressure-thickness recitations have been removed from amended claims 6, 20 and 44.

Rejections Under 35 USC §103

1. Claims 1-20 and 42-44

Claims 1-20 and 42-44 have been rejected under 35 USC §103(a) as being unpatentable over Krall (US Patent No. 4,713,235) in view of Chorbadjiev et al. (article entitled "The effect of fillers upon properties of electroconductive cyanoacrylate adhesives from the International Journal of Adhesion and Adhesives July 1988), the admitted prior art, either one of Zwick (US Patent No. 5,690,766) or PCT WO 97/06953, and either one of Loctite 410 or Loctite 416, optionally taken with the state of the prior art as exemplified by at least one of Liang et al. (US Patent No. 5,233,131), Fogal et al. (US Patent No. 5,140,404), Farnworth (US Patent No. 5,218,229), Davis (US Patent No. 5,214,307) and German Patent 4107347.

A summary of the prior art in the above rejections is as follows.

A. Krall is directed to radiopaque cyanoacrylates and states at column 1, lines 47-53: "For instance, in the

manufacture of electronic micro-chips it has been suggested that MCA may be a useful adhesive for joining contact leads to the chips. Since a major failure mode of electronic chips occurs at the chip-lead interface, it would be advantageous if such cyanoacrylate adhesives were radiopaque so that the weld could be examined".

B. Chorbadjiev et al. is directed to the effect of fillers upon the properties of electroconductive cyanoacrylate adhesives.

C. The admitted prior art is directed to a method for attaching semiconductor dice to leadframes using polymer adhesives.

D. Zwick is directed to a method and apparatus for bonding dice to leadframes using an adhesive and vibrations.

E. Loctite 410 and Loctite 416 are directed to industrial grade cyanoacrylate adhesives.

References F-L are representative of the art of bonding and wire bonding a semiconductor die to a leadframe.

F. Liang et al. is directed to a die to leadframe interconnect assembly system using wire bonding.

G. Fogal et al. is directed to a method for manufacturing a semiconductor device using a thermoplastic covered carrier tape and wire bonding.

H. Farnworth is directed to a leadframe having improved busing and die attachment with wire bonding.

I. Davis is directed to a leadframe for wire bonded semiconductor dice having bumps which contact a die to provide a uniform fillet of adhesive.

J. German Patent 4107347 is directed to attaching a chip to a leadframe using wire bonding.

2. Claims 21, 22 40 and 41

Claims 21, 22, 40 and 41 have been rejected under 35 USC §103(a) as being unpatentable over the admitted prior art in view of either one of PCT WO 97/06953 or Zwick (US Patent No. 5,690,766) and JP 58196280.

A summary of the prior art in the above rejections is as follows.

A. The admitted prior art is directed to a method for attaching semiconductor dice to leadframes using polymer adhesives.

B. PCT WO 97/06953 is directed to a die bonding system that includes a function generator for vibrating the adhesive.

C. Zwick is directed to a method and apparatus for bonding dice to leadframes using an adhesive and vibrations.

D. JP 58196280 is directed to an electrically conductive paste for "fixing a part such as an electronic element chip to a substrate keeping the electrical conductivity to the substrate in a short time at normal temperature without using a temporary bonding process".

Argument

The rejections under 35 USC §103 are traversed for essentially the reasons of record. However, independent claim 15 has been amended to include the limitations of claim 16 of providing a die attach system and performing the applying and placing steps using the system. In addition, dependent claim 16 has been amended to state the system comprises a die attacher.

As this application has had a lengthy prosecution, this Amendment attempts to simplify the issues, and to summarize the rejections and the traversals.

Rejected Claims

The following claim chart summarizes the recitations in the claims.

| <u>Claims</u> | <u>Recitations</u> |
|---------------|--|
| 1-20 | Independent claims 1, 6, 12, and 15 each recite a semiconductor packaging method in which a cyanoacrylate adhesive material is applied to a die or a leadframe, the die and the leadframe are pressed together to form an adhesive layer therebetween, and the adhesive layer is polymerized without heating the die and the leadframe in less than sixty seconds. |
| 6-11 | Independent claim 6 also recites performing the method using a die attach system, and with a volume of the adhesive selected to provide a selected thickness for the adhesive layer. |
| 12-14 | Independent claim 12 also recites performing the method using a die attacher. |
| 15-20 | Amended independent claim 15 also recites performing the method using a system comprising a leadframe feed mechanism for manipulating the leadframe, a vacuum tool for manipulating the |

die, and a dispensing mechanism for applying the adhesive material.

- 21-22 Independent claim 21 recites a semiconductor
40-41 packaging method in which an anaerobic acrylic
 adhesive material is applied to a die or a
 leadframe, the die and the leadframe are pressed
 together to form an adhesive layer therebetween,
 and the adhesive layer is polymerized without
 heating the die and the leadframe in less than
 sixty seconds.
- 42-44 Independent claim 42 recites a semiconductor
 packaging method in which a cyanoacrylate
 adhesive material or an anaerobic acrylic
 material is provided with at least one filler
 configured to tailor a characteristic of the
 material. In addition, claim 42 recites the
 steps of applying the material to a die or a
 leadframe using a die attacher, pressing the die
 and the leadframe together using the die attacher
 to form an adhesive layer, and then polymerizing
 the adhesive layer without heating the die and
 the leadframe in less than sixty seconds.

Summary of Traversals

A. The 35 USC §103 rejections of claims 1-20 and 42-44 have been traversed because these claims define features which are not taught or suggested by the art as required MPEP 2142, 2143. In particular the prior art does not disclose the following features.

1. A semiconductor packaging method which includes the steps of providing a cyanoacrylate adhesive, applying the adhesive to a die or a leadframe, and then polymerizing the adhesive without heating the die and the leadframe in less than about 60 seconds.

2. Using a die attach system or a die attacher in a semiconductor packaging method to apply a cyanoacrylate adhesive and to press the die and the leadframe together.

3. Using a volume of a cyanoacrylate adhesive material in a semiconductor packaging method to control a thickness of the adhesive layer.

4. Using a cyanoacrylate adhesive in a semiconductor packaging method with a filler configured to tailor a characteristic of the adhesive.

5. Using a catalyst in a semiconductor packaging method with a cyanoacrylate adhesive.

B. The 35 USC §103(a) rejections of claims 1-20 and 42-44 based on Krall have been traversed as this reference is non analogous art. In this regard, Krall is directed to "Radiopaque Cyanoacrylates" for medical procedures. As such, Krall is not in the field of semiconductor packaging, and does not relate to the problem of attaching a semiconductor die to a leadframe. Rather, Krall is in the medical field, and relates to the problem of making a radiopaque cyanoacrylate for medical applications (column

1, lines 56-59). Accordingly, one skilled in the art of semiconductor packaging at the time of the invention would have no presumed knowledge of Krall, and would have no incentive to combine Krall with semiconductor packaging art.

In addition to being non analogous art, Krall does not enable a semiconductor packaging method in which a cyanoacrylate adhesive is used to bond a semiconductor die to a leadframe.

C. The 35 USC §103(a) rejections of claims 1-20 and 42-44 have been traversed because one skilled in the art at the time of the invention would have no incentive to combine the cited references in the manner of the Office Action as required MPEP 2142, 2143. Rather, the references have been combined and interpreted using the teachings of the present specification as a road map.

D. The 35 USC §103 rejections of claims 21-22 and 40-41 have been traversed because these claims define features which are not taught or suggested by the art as required MPEP 2142, 2143.

1. A semiconductor packaging method which includes the steps of providing an anaerobic acrylic adhesive material, applying the adhesive to a die or a leadframe, and then polymerizing the adhesive without heating the die and the leadframe in less than about 60 seconds.

2. Using a die attach system to perform an applying step using an anaerobic acrylic adhesive material.

3. Using a catalyst in a semiconductor packaging method with an anaerobic acrylic adhesive material.

E. The 35 USC §103(a) rejections of claims 21-22 and 40-41 have been traversed because one skilled in the art at

the time of the invention would have no incentive to combine the cited references in the manner of the Office Action as required MPEP 2142, 2143.

Conclusion

In view of the amendments and arguments, reconsideration of the traversals, and allowance of claims 1-22, and 40-44 is requested. Should any issues remain, the Examiner is asked to contact the undersigned by telephone.

DATED this 27th day of July, 2005.

Respectfully submitted:



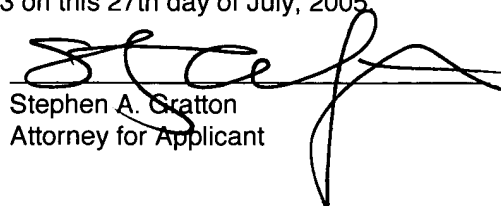
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